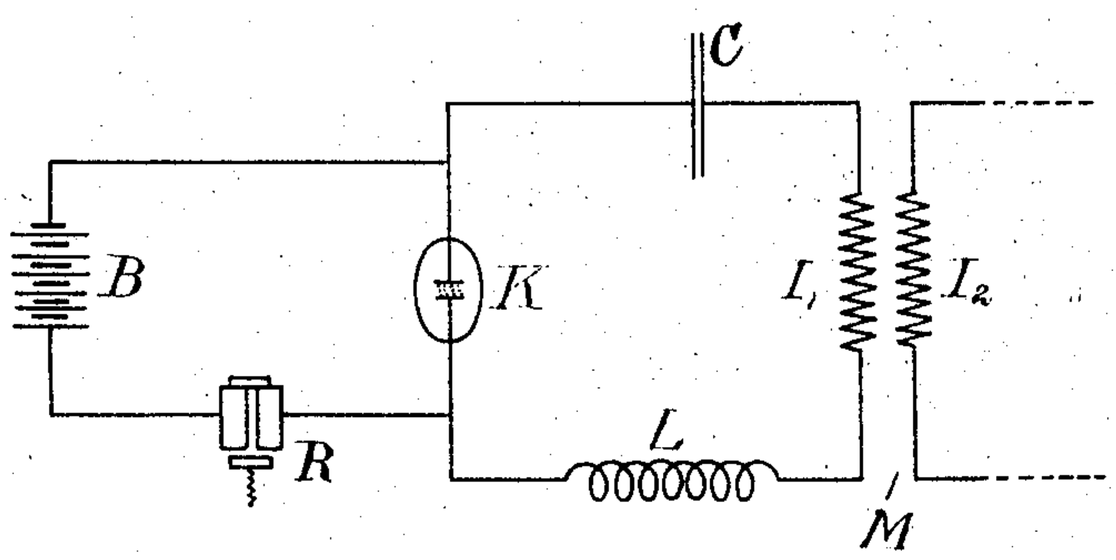
No. 767,991. PATENTED AUG. 16, 1904.

J. S. STONE.

SPACE TELEGRAPHY.

APPLICATION FILED DEC. 23, 1903.

NO MODEL.



WITNESSES.
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No. 767,991. Patented August 16, 1904.

UNITED STATES PATENT OFFICE.

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SPACE TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 767,991, dated August 16, 1904.

Original application filed November 24, 1903. Renewed June 20, 1904. Serial No. 213,323. Divided and this application filed December 23, 1903. Serial No. 186,313. (No model.)

To all whom it may concern:

Be it known that I, JOHN STONE STONE, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Space Telegraphy, of which the following is a specification.

My invention relates to the art of transmitting intelligence from one station to another by means of electromagnetic waves without the use of wires to guide the waves to their destination; and it relates more particularly to a method of receiving signals transmitted by such waves.

This application is restricted to a method of receiving space-telegraph signals which may be conveniently carried out by means of the apparatus and circuit arrangements illustrated in Figure 10 of my application, Serial No. 4,505, filed February 8, 1900, and upon which Patent No. 714,756 was granted December 2, 1902. In Figs. 6 and 11 of said patent I have illustrated an electroreceptive device diagrammatically shown as a coherer, but which may be any other suitable form of receiver or wave-detector, connected in shunt-circuit to one of the tuning elements of the resonant circuit. In Fig. 6 the tuning element is a condenser, and in Fig. 11 the tuning element is an inductance-coil. In Fig. 12 the electroreceptive device is itself one of the tuning elements of a resonant circuit. In Fig. 10 of said patent the electroreceptive device is serially connected in the closed resonant circuit, but does not form one of the tuning elements thereof, as is the case with the condenser telephone-receiver shown in Fig. 12.

In the drawing which accompanies and forms a part of this specification the figure represents diagrammatically an arrangement of apparatus and circuits whereby the method herein described and claimed may be carried into effect.

I_2 is the primary of a transformer which is either connected in series with an elevated conductor, as shown in Fig. 6 of my patent aforesaid, or is included in a closed resonant circuit interposed between said elevated conductor and the resonant circuit containing the electroreceptive device K, as shown in Fig. 8 of said patent. I_1 is the secondary of the transformer M, of which I_2 is the primary. L is an inductance. C is a condenser. K is an electroreceptive device, herein diagrammatically illustrated as a coherer, but which may be any receiver adapted for the purpose. R is a relay or other signal-indicating device. B is a battery.

For details of construction of apparatus and for the operation thereof reference may be had to my patent hereinbefore referred to.

When the electroreceptive device is a coherer with contacts under light pressure, it is equivalent to a condenser, and its capacity should be made great as compared to that of the tuning-condenser for the reason more fully explained in my prior patent, No. 714,756, in connection with the condenser C', Fig. 6, of C'', Fig. 8.

I desire to point out that for the reasons more fully set forth in my prior patent I find it necessary, in order to effect the selective absorption of the energy of electromagnetic waves of a predetermined frequency to the practical exclusion of the energy of waves of other frequencies, to so design the coils that the kinetic energy of the current in the coil shall be large compared to its potential energy when the coil is supporting a current of the said predetermined frequency. It is, furthermore, a characteristic of my invention that this selective absorption of the energy of electromagnetic waves of a predetermined frequency is accomplished solely by means of the closed circuit C K L I_1, made resonant to said frequency by the adjustment of the capacity of the condenser to the inductance of the coil and not by the tuning of the induction-coil or transformer by an adjustment of the distributed capacity of its coils to the distributed inductance of its coils. This selective absorption of the energy of electromagnetic waves of a predetermined frequency to the practical exclusion of the energy of like waves of other frequencies, which is effected by means of the closed resonant circuit C K

L I, attuned to said predetermined frequency, is due to the well-known property of a properly-designed resonant circuit, whereby such circuit favors the development in it of simple harmonic currents or electric oscillations of the frequency to which it is attuned by coördinating the amplitudes of successive currents or electric oscillations of said frequency, thereby amplifying the currents or electric oscillations of said frequency, and whereby it strongly opposes the development in it of simple harmonic currents or electric oscillations of other frequencies, as I have pointed out in my prior patent.

It is characteristic of my invention that the energy of the electrical oscillations developed in the elevated conductor by electromagnetic waves is transferred to the closed secondary circuit entirely by electromagnetic induction, and to this end the coils are designed so as to exclude as far as possible the displacement-currents which tend to exist between adjacent turns of each winding and between the primary and secondary windings. In this way and by observing the injunctions laid down in my prior patent the electroreceptive device will respond to electromagnetic signal-waves of one frequency to the exclusion of like waves of other frequencies, although the other frequencies be aliquot parts of the frequency to which the resonant circuit or circuits are attuned.

An apparatus whereby the herein-described method may be carried out is claimed in my application, Serial No. 213,323, filed November 24, 1903, and renewed June 20, 1904.

Having described my invention, I claim

1. The method of selectively receiving the energy of electromagnetic signal-waves of predetermined frequency, which consists in receiving the same in an elevated conductor, translating or conveying the energy of the resulting electric oscillations to a resonant circuit attuned to said frequency and thereby effecting the response of an electroreceptive device serially connected in said resonant circuit but not forming one of the tuning elements thereof.

2. The method of selectively receiving the energy of electromagnetic signal-waves of predetermined frequency, which consists in receiving the same in an elevated conductor, thereby developing in said elevated conductor electrical oscillations of corresponding frequency, amplifying said electrical oscillations by means of a circuit whose capacity and inductance is predetermined by said frequency and which is more responsive to electrical oscillations of said frequency than to electrical oscillations of other frequencies and thereby effecting the response of an electroreceptive device serially connected in said circuit but not forming one of the tuning elements thereof.

3. The method of selectively receiving the energy of electromagnetic signal-waves of predetermined frequency, which consists in receiving the same in an elevated conductor, thereby developing in said elevated conductor electrical oscillations of corresponding frequency, translating or conveying the energy of said electrical oscillations solely by magnetic induction to a circuit, attuned to said predetermined frequency, amplifying said electrical oscillations by means of said circuit and thereby effecting the response of an electroreceptive device serially connected in said circuit but not forming one of the tuning elements thereof.

4. The method of receiving the energy of simple harmonic electromagnetic signal-waves, which consists in receiving the same in an elevated conductor, translating or conveying the energy of the resulting electrical oscillations to a resonant circuit, associated with said elevated conductor and attuned to the frequency of the electromagnetic waves the energy of which is to be received, amplifying the said electrical oscillations by means of said resonant circuit and thereby operating an electroreceptive device serially connected in said resonant circuit but not forming one of the tuning elements thereof.

5. The method of receiving the energy of electromagnetic signal-waves, which consists in receiving the same in an elevated conductor, translating or conveying the energy of the resulting electrical oscillations to a circuit associated with said elevated conductor and having its capacity and inductance so correlated and adjusted that currents of greater amplitude or strength are developed in said circuit by electromagnetic waves of one frequency than by like waves of different frequencies and operating, by the energy of said electrical oscillations, an electroreceptive device serially connected in said circuit but not forming one of the tuning elements thereof.

6. The method of receiving the energy of electromagnetic waves of one frequency to the exclusion of the energy of like waves of different frequencies, which consists in absorbing the energy of electromagnetic waves of predetermined frequency by an elevated conductor, thereby creating electrical oscillations of corresponding frequency in said elevated conductor, amplifying said electrical oscillations by means of a circuit having its capacity and inductance predetermined by said frequency and thereby operating an electroreceptive device serially connected in said circuit but not forming one of the tuning elements thereof.

In testimony whereof I have hereunto subscribed my name this 22d day of December, 1903.

JOHN STONE STONE.

Witnesses:

G. ADELAIDE HIGGINS,

BRAINERD T. JUDKINS.